Veterinary Parasitology 166 (2009) 163–166

Contents lists available at ScienceDirect

Veterinary Parasitology

journal homepage: www.elsevier.com/locate/vetpar

Short communication

Detection of *Theileria parva* antibodies in the African buffalo (*Syncerus caffer*) in the livestock–wildlife interface areas of Zambia

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ARTICLE INFO

Article history:
Received 22 May 2009
Received in revised form 15 July 2009
Accepted 6 August 2009

Keywords:
Theileria parva
African buffalo
Wildlife
Livestock interface

ABSTRACT

A serologicigical survey was conducted for the detection of *Theileria parva* antibodies in 176 African buffaloes (*Syncerus caffer*) sampled between 1996 and 2005 in livestock–wildlife interface areas of Zambia. *Rhipicephalus appendiculatus*, *Rhipicephalus species*, and *Amblyomma variegatum* were the most abundant tick species identified on buffaloes. *T. parva* sero-positives were reported in buffaloes sampled from game management areas at Mlanga and Nanzhila bordering the Kafue National Parks and in the Lochnivar National Park while buffaloes sampled from Lower Zambezi National Park were sero-negative. Given that Game Management Areas serve as interface areas that permit the co-existence of livestock and wildlife in similar ecological habitats our findings suggest that buffaloes could play a significant role in the epidemiology of theileriosis in livestock–wildlife interface areas. Thus far, the disease has only been reported in livestock and is herein being reported in the African buffalo for the first time in Zambia.

1. Introduction

Theileriosis is a highly pathogenic tick-borne disease associated with severe mortalities and high economic losses in livestock. Recent studies have shown that the disease is a potential constraint to *ex situ* conservation (Munang'andu et al., 2006). Theileriosis was first reported in Zambia in 1922 in the Northern Province as East coast fever (ECF). In 1977–1978 a malignant form of theileriosis was reported in Monze in the Southern Province (Chizyuka and Mangani, 1985). Based on the criteria set by Neitz (1955) the disease was diagnosed as Corridor disease (CD) (Chizyuka and Mangani, 1985). Prior to this, Southern Province was free of theileriosis and the malignant form of the disease had never been reported in Zambia (Nambota et al., 1994). The disease is endemic in the Southern Province extending into Lusaka and Central Provinces (Nambota et al., 1994). Although the African buffalo is considered to be the wildlife reservoir (Grootenhuis et al., 1987) the presence of theileriosis has not been investigated in buffaloes in Zambia. This paper reports for the first time the presence of *Theileria parva* antibodies in African buffaloes in Zambia.

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doi:10.1016/j.vetpar.2009.08.010

Table 1
Indirect fluorescent antibody test results.

Study area	Year	Month	Age	Herds sampled	Estimated herd size	Animals sampled	Animals with antibodies at following titers		Total positive	Prevalence (%)[a]
							1:80	1:160		
Nanzhila (Kafue NP)	1996	June	Adults	1	84	10	3	3	6	60.0%
Lochnivar NP	1996	June	Adults	1	48	10	4	3	7	70.0%
Mlanga (Kafue NP)	1996	June	Adults	1	140	10	4	0	4	40.0%
Lower Zambezi NP	2001	August	Adults	1	125	21	0	0	0	00.0%
Lochnivar NP	2003	December	Adults	1	32	14	7	4	11	78.6%
Nanzhila (Kafue NP)	2004	August	Young	5	427	48	14	7	21	43.7%
Nanzhila (Kafue NP)	2005	July	Young	7	608	62	12	10	22	35.5%
Total						175	44	27	71	40.6%

[a] Prevalence is expressed as a percentage of animals tested positive out the total that was sampled.

2. Materials and methods

2.1. Study areas

Four study areas were selected; three (Nanzhila, Lochnivar and Blue Lagoon) from the upland areas on the Kafue flats with altitudes around 1000 m and one from the valley in the Lower Zambezi National Park (NP) with an altitude of 560 m.

2.2. Capture of animals

Herds were driven into 'capture bomas' using a helicopter and an estimate of the herd size was obtained by getting a mean of three herd counts. Buffaloes chosen for capture were immobilized using M99 (etorphine hydrochloride) and reversed using M5050 revivon (diprenorphine) at standard capture dosages (Novartis SA Ltd., Animal Health). Age was determined by tooth and horn development complemented by horn segmentation size (Grimsdell, 1973). The sampled animals were painted with a silver coat to avoid sampling from the same herds at subsequent captures.

2.3. Sampling

Blood samples were collected by venipuncturing of the jugular vein using 18G vacutaner needles into 10 ml vacutaner tubes. Serum was separated from blood clots using a centrifuge at 1500 rpm, 4 °C for 10 min at the School of Veterinary Medicine, in Lusaka. All serum samples were stored in cryogenic vials at −80 °C until use. Ticks were collected in 70% ethanol for identification.

2.4. Indirect fluorescent antibody test (IFAT)

Sera was diluted in twofold dilutions starting with 1/40, 1/80 and 1/160. In vitro cultured *T. parva* (Katete strain) infected lymphoblasts were used as antigen for antibody detection. Anti-bovine fluorescein-labeled conjugate was applied after the antigen-antibody binding, producing fluorescent schizonts in positive samples (Burridge and Kimber, 1972). A total of 175 serum samples were examined (Table 1). This technique (IFAT) has previously been used on livestock sera in Zambia and its sensitivity and specificity has been evaluated and discussed elsewhere (Billiouw et al., 2005). Ticks were identified using standard keys after observation under a stereoscopic microscope.

3. Results

Rhipicephalus appendiculatus and other *Rhipicephalus species* were the most abundant species identified followed by *Amblyomma variegatum* (Table 2). Generally, the tick burden and the number of infested buffaloes were lower in the Lower Zambezi NP compared to Mlanga, Nanzhila and Lochinvar NP.

4. Discussion

Detection of *T. parva* antibodies in buffaloes from the Kafue flats has a significant implication on the epidemiology of theileriosis in Zambia. The Kafue flats provide a unique ecological habitat that attracts both wild and domestic bovids during the dry season. Traditional livestock owners from surrounding districts (Fig. 1) practice a transhumance grazing system that brings their cattle in close contact with wild bovids. Hence, ticks that feed on cattle are likely to feed on wild animals. The presence of *T. parva* in cattle from areas encompassing the Kafue flats has been reported by several scientists (Young and Leitch, 1981; Nambota et al., 1997; Fandamu et al., 2005), while tick species infecting cattle from the same areas have been reviewed by other scientist (Pegram et al., 1986; Speybroeck et al., 2002). The present study reflects the seroprevalence of *T. parva* antibodies and tick species infecting buffaloes in the same area.

T. parva antibodies were not detected from buffaloes in the Lower Zambezi NP (0/21) unlike Mlanga which had a seroprevalence of 40% (4/10). The absence of sero-positives in Lower Zambezi can be attributed to lack of contact with cattle which could act as a source of infection to naive wildlife populations. The lack of a wildlife–livestock interface in the lower Zambezi may mean that buffalo herds resident in the park might be living in a closed system that does not allow for exposure to theileriosis infection. Young and Leitch (1981) observed that the climatic conditions in the valley were detrimental to the growth of *T. parva* in the ticks while Speybroeck et al. (2002) observed that the climatic conditions were unfavorable for the survival of most tick species. Hence, the tick population in the valley is